



# bobwhite quail



South Carolina  
Department of Natural Resources



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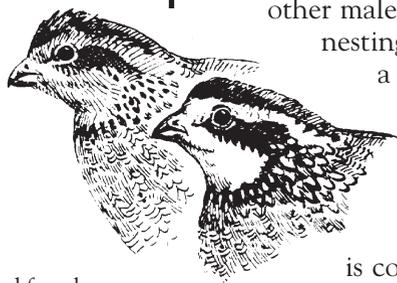
The bobwhite quail has long been considered the game bird of the South, and South Carolina's quail population has made it known as one of the best quail states.

A review of history reveals that quail populations have increased and declined as man and the progress of civilization have continued to alter the environment. Prehistoric quail populations were relatively low, due to vast essentially unbroken tracts of timber which provided poor habitat. Early land-use practices associated with pioneer settlements were typified by a patchy farming pattern which provided ideal quail habitat, and quail increased until around 1900.

Through the early to mid-1900s, quail population densities remained high and quite stable. However, since probably the mid-1940s, quail numbers have declined over much of their range. This downward trend is largely associated with deteriorating habitat conditions resulting from: 1) a change to cleaner and more mechanized farming methods, 2) the joining of small patchwork fields to make large unbroken fields suitable for intensive cultivation, 3) the development of introduced grass pastures for cattle, dairy or hay production, 4) intensified timber production and 5) the restricted use of fire in pine forests, which has created woodlands too dense for permanent habitation by quail. Few wild species, however, are more capable than quail of adapting to man's manipulation of the environment. We will continue to hear the call "bobwhite" in the spring, and many areas of the state will continue to harbor huntable populations.

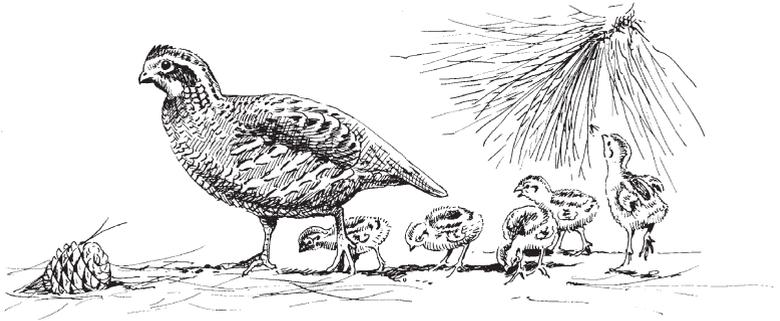
## life history

In addition to longer, warmer days, the greening of foliage and flowering plants, the bobwhite's whistle is one of the earliest signals of the coming of spring and summer. Shortly after the first bird is heard, winter coveys slowly begin to break up and courting pairs may be observed. After initial mating has taken place, pairs are usually inseparable and the cock has little trouble defending his mate from other males. A mated pair will normally remain together until nesting and rearing of chicks is complete. After choosing a nesting site, the pair gathers available dead plant material (grasses, stems and pine needles) and constructs the nest in a slight depression in the soil. The female generally lays the first egg within a few days after the nest is finished, and usually will continue to lay one egg daily until the clutch is complete. However, it has been documented that the cock bird may leave to find another hen to mate with, and sometimes the hen may leave the cock to incubate the nest and go find another mate herself. Clutch size averages about 14 in South Carolina, with original nesting attempts containing a slightly



After mating, the male and female are usually inseparable until nesting and rearing are complete.

Both cock and hen share the responsibilities of brooding young birds and either will continue to rear the chicks following the death of a mate.



The nesting season in South Carolina runs from April to October with most hatching occurring from June to August. Commonly there are two or three hatching peaks brought on by widespread simultaneous nest failures. Nesting attempts may fail due to detrimental weather conditions, predators, agricultural activity, or other environmental factors. Nest failures, however, are not necessarily bad in that they spread out the hatching dates and thus reduce the total effect of any mass mortality of the young due to natural disasters. Late hatched birds have a greater chance of surviving until the hunting season, and a high percentage of late hatched birds is generally associated with good fall hunting.

As both cock and hen usually share the responsibilities of brooding young birds, either will continue to brood the chicks following the death of a mate. The young are considered full grown at 16 weeks of age, and the young of the year will normally make up the major portion of coveys which form during the fall.

## needs of the bobwhite food & cover requirements

Quail are primarily feeders of fields and open forests. Their diet is mainly vegetable and is composed largely of seeds, small fruits and green forage. Animal matter may be consumed year-round, but makes up a higher percentage of the diet during the warmer months. Insects are an especially important source of protein for young quail, comprising over 80% of the diet. Seeds of legumes are probably the most important native quail foods with grasses and sedges being of secondary importance. Soft and hard mast (berries and nuts) and cultivated grains are also eaten. Some of the most



Insects are an important source of protein for young quail.

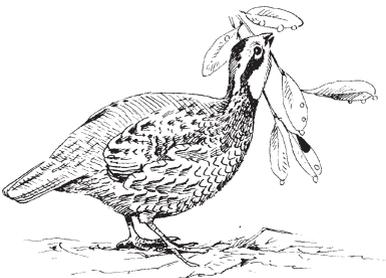
important food items utilized in South Carolina include: the native beggarweeds, partridge peas, milkpeas, butterfly peas, the native and cultivated lespedezas (common, Kobe, Korean, bicolor and thunbergii), sesbania, paspalum, panic grass, ragweed, chocolate weed, blackberry, mulberry, pine, oak, sweetgum, and cultivated crops such as cowpeas, soybeans, sorghum, wheat and corn.

Although quail are commonly seen in the vicinity of open water and are occasionally observed drinking surface water, it is not essential as birds normally receive their water requirements from dew, insects and succulent green vegetation.

In general, quail like a diversity of cover types including forests, brush, grass and cultivated lands. When all or a combination of these conditions exist, population density usually depends largely on distribution of these four types. Bobwhites prefer areas where all cover types may be found within their normal 40-acre range.

## habitat improvements & other considerations

Considerable research and effort has been put forth in developing sound, effective, and relatively simple management programs for quail. Quail respond quickly to proper management techniques and in certain areas populations may reach high densities in a short time. The information needed to put more birds on your land is available, but it is up to you to put it to work.



Quail receive most of their water requirements from dew, insects and succulent green vegetation.

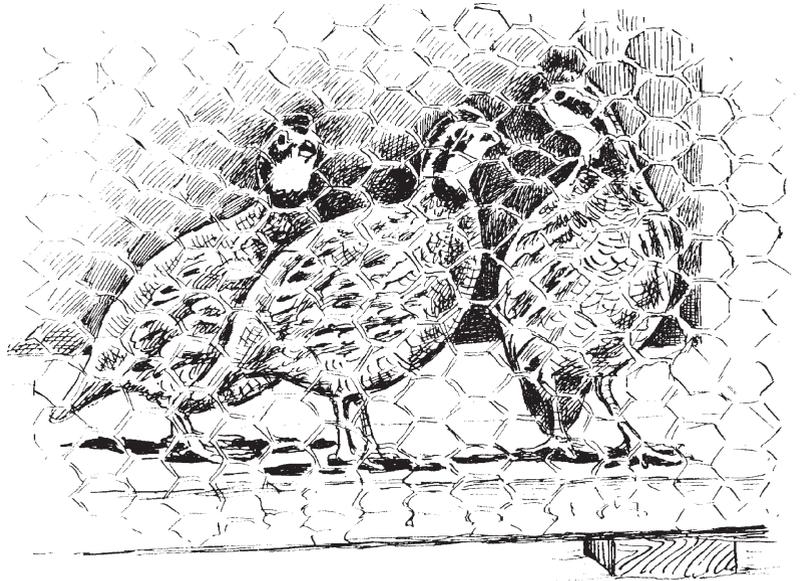
## bobwhite, fact, fiction & tall tales

Over the decades, popularity of the bobwhite quail has led to the evolution of a number of popular beliefs and tales pertaining to this fine game bird. Many of these evolved locally, while others are heard throughout the range of the bobwhite. Nearly all have been handed down through successive generations of hunters, landowners and other interested individuals. While these beliefs add to the appeal of the species and reflect a popular interest, many are actually guilty of precipitating a waste of time, effort and money, misguidedly directed toward improving the welfare of the bobwhite.

Probably one of the most popular misconceptions of how to permanently increase wild quail populations is through the stocking or release of pen-raised quail. This technique was widely practiced by many state wildlife agencies and private conservation groups in the Southeast during the late 1940s and early 1950s. After thorough evaluation, it was found to be extremely expensive and completely unsuccessful.

Study of the technique determined that any native quail present in an area (and there are few areas in South Carolina without native birds) will occupy all of the suitable habitat available. Since

Releasing pen-reared quail is not the solution to permanently increasing the number of native quail and may actually result in the decline of wild quail populations.



a surplus of wild quail is produced each year by natural production, stocked birds will probably be eliminated as part of the surplus. In other words, it is not logical to expect a pen-reared bird to survive in habitat that will not even support native quail. Releasing birds shortly before the opening of the season and before the gun has limited use, but is uneconomical since only a small percentage of the released birds are normally recovered. Early release methods whereby birds of at least 12 weeks of age are released in August or September can result in a fall and winter population that most closely resembles wild quail for hunting. However, it is very costly as about twice as many birds as desired for hunting must be released, and carry-over to the next year is negligible. The danger of introducing disease into the native quail population (as well as wild turkeys) from pen-raised birds is also present, but has actually been rarely documented. The key to permanently increasing quail populations is habitat improvement on an adequate scale which is discussed later in this booklet.

Another popular and widespread tale is that many quail found in the Southeast today are descendants of a subspecies of bobwhite commonly called Mexican quail which were released in many sections of the Southeast during the 1930s and 1940s. Local lore suggests that these Mexican birds have all but replaced our native quail, as can be evidenced by their smaller size, different coloration, tendencies to run before dogs, to flush wild, and to fly to the nearest thicket or swamp regardless of the distance.

Although many of these behavioral characteristics are obvious to any dedicated bird hunter, research has shown that only a few of the Mexican quail survived, and the characteristics and traits of those which did interbreed with the native bobwhites were quickly diluted and have become obscure with time.

Size differences may be simply explained by the fact that some individual birds, as with deer, man and other creatures, are simply larger than other members of the same species. The hunter who kills an adult male and compares it with several immature birds is likely to conclude that he took the larger individual from a covey of the "old Bobwhites." Color variations are simply differences in color characteristics among individuals of the same species. Therefore birds which appear to be light-colored do not have to be descendants of the Mexican quail and dark or reddish birds do not necessarily come from the deep swamp, as some believe.

Changes in behavioral characteristics such as running, flushing wild and flying long distances to heavy cover, are not the results of crossbreeding with Mexican quail but are our native birds' adaptation to increased pressure from predation, habitat changes, and sometimes hunting pressure. The hen who runs ahead of the dogs, flushes wild and consistently heads to the nearest swamp when flushed is more likely to survive to produce a brood the following spring, some of which may possess the same traits. On the other hand, the hen which holds tight or flies to a narrow fence row usually won't be around the following spring to have the worries of motherhood.

Although some hunters complain about these new characteristics, most accept them as an added challenge in the sport of quail hunting. In any event, the ability of the quail to adapt to external pressures and a changing environment is one reason why this game bird has maintained population levels capable of sustaining considerable hunting pressure.



Quail hunting is one of the fringe benefits of good management. Approximately 15-20 percent of the population may be taken by hunting (including crippling loss) each fall and winter without adversely affecting next year's crop, under normal conditions.

Nest predation can be a factor in limiting quail populations. Renesting attempts may or may not be made by quail whose nests are destroyed prior to hatching.



On a year following poor nesting or brood rearing conditions, such as hot dry summers or summers with unusually heavy rainfall, and when the fall quail population doesn't appear to be up to normal expectations, it is common to hear, "Why doesn't the state close the quail season this year?" And some dedicated and enthusiastic quail hunters will hang up their guns. While this dedication and interest in the welfare of the bobwhite is commendable, they had just as well enjoy that season's hunt. Here's why: Bobwhite quail (and most other small animals) are extremely short-lived. That is, of every 100 birds alive in the fall, between 75 and 80 will die or be killed within the next 12 months, and mortality rates will remain essentially the same in both hunted and unhunted populations. Hunting only removes surplus birds before they are lost to natural causes. For this reason, hunting in years of lower than average quail populations will not reduce the prospects for a quick return to normal levels, if food, cover and general habitat conditions remain unchanged. It is generally accepted that 15-20% of a quail population can be removed by hunting (including crippling loss).

Few subjects invoke more discussion and occasional anger than the topic of predation. It is common to hear; "If it wasn't for the foxes and the hawks we'd have lots of birds," or "Those old house cats wiped out three of my biggest coveys." It is true that foxes, hawks, cats and other predators kill an occasional quail, but before we condemn these animals, let's take a close look at the actual effect predation may have on a species.

Predation is the act of an animal killing and eating another, and it must be remembered that man is the most important, if not the most efficient, predator on earth.

There are numerous factors controlling the extent of predation

on bobwhites. The available habitat is important, especially the quantity, quality and distribution of escape cover. The ratio of predators to prey is also important. Predation, therefore, is likely to be heaviest when unnaturally high populations of prey species exist in habitat which is incapable of support or protection .

The presence of a buffer species may also affect the amount of predation on quail or other species. For example, if cotton rat populations are high, foxes will normally prey on this species instead of quail because they are easier to catch. However, if cotton rats are low in number or not available, the fox may prey on quail although he will have to work harder at taking them.

The thorough view of predation, although rarely noted, takes in its beneficial aspects. Predators may actually benefit some species (especially big game species) by removing surplus individuals, thus preventing a population buildup beyond the carrying capacity of the land which may result in food shortages, habitat damage, and die-offs. Predators normally remove or catch the unfit (weaker, deformed, sick and diseased individuals). This helps to reduce the spread of disease and allows the fittest to survive and reproduce, resulting in an improved genetic quality of the species.

As was stated earlier, natural predation, hunting, disease, exposure and other mortality factors take about 80 of every 100 birds present in the fall. The problem of the quail manager, therefore, is to improve his land and habitat so that it can produce and carry a larger number of quail, and not attempt to decrease the natural turnover due to predation and other natural causes. As the noted conservationist Aldo Leopold said, "If a habitat can't support game in spite of predators, it simply isn't good game habitat."

However, recent research has shown that high levels of nest predators such as raccoons, opossums, and skunks, and to a lesser extent foxes and bobcats can depress quail populations by reducing recruitment. Nest predator trapping immediately ahead of the quail nesting season can be a beneficial practice, provided the property has very high quality habitat. If the habitat needs work, efforts are better expended on restoration. Nest predator trapping is most effective later in the spring after the regular state trapping season closes, so a special permit is required through the DNR.

Since the establishment of coyotes in South Carolina and elsewhere, there has been concern about their impact on quail and other game species. At least in the case of quail, while coyotes may occasionally depredate a nest, it would very rare that they could catch a healthy adult. Coyotes may actually be beneficial for bobwhites by preying on more common quail nest predators like raccoons and opossums.

While the white-tailed deer certainly does not qualify as a quail predator, deer populations in many portions of the Southeast have grown such that they may be competitors with quail. Native and planted quail foods may be browsed by deer to the point of

limiting seed production. Proper management of the herd through regulated antlerless deer harvest is a must on tracts where high quail populations are desired. Good deer management is a part of good quail management.

It is a common belief in many areas that a pair of bobwhites will rear more than 1 brood a year under ideal conditions. One theory holds that 2 nests are built by the pair, after which the hen lays 2 clutches of eggs, one of which is incubated by her and the other by the cock. A simpler tale is that a pair will bring off 1 brood which will be cared for by the male, while the hen lays and incubates another clutch. Two broods from 1 pair during a single nesting season has been documented, but this rarely occurs. A single hen with different roosters may pull off multiple hatches in years of favorable weather and high quality habitat.

Two other old wives' tales concerning nesting are common in certain local areas. The most common of these holds that if you trap hens from one area and release them in areas where there is an abundance of unmated cocks (usually on your land) you can increase the quail population on that particular piece of land. This idea is erroneous or impractical for several reasons. First, you may trap a hen which is already mated and in some state of nest building or incubation. If this happens you may have destroyed 1 potential hatch of young birds. Secondly, should the hen mate with an excess cock and begin the nesting process when nesting habitat is a limiting factor in the quail population, their nesting attempts will be in unfavorable habitat and chances of a successful hatch are extremely low. Thirdly, and most important, this practice may actually result in less reproduction and a lower fall population by suppressing nesting attempts due to an artificially high spring population.

Late summer or fall plowing of crop residue should be avoided whenever possible unless an unplowed strip of residue can be left around field edges.



It boils down to the fact that an excess of males, whether it is quail, dogs or man, is a natural phenomenon and, regardless of the techniques or procedures tried, you can never permanently increase quail populations beyond what the habitat will support.

The second misconception regarding nesting is that if you see 2 cocks with 1 hen you had better kill 1 of the roosters or he will destroy the nest of the other two. The problem is to make sure you kill the right cock. Seriously, it is common, especially during the early part of the breeding season, to see more than 1 rooster courting a hen. Normally 1 of the roosters will be dominant and will successfully mate with the hen. Once the pair have mated, the cock has little trouble in driving away all callers and home wreckers.

One of the oldest ideas pertaining to quail hunting is the “shoot’em up to prevent inbreeding” theory. This idea has been unconditionally disproved. Birds hatched during the summer do not remain in family groups but may move to several different coveys during the “fall shuffle” of covey formation. This movement between coveys continues during the winter months and, during covey breakup in the spring, individual birds may move a distance of several miles. The reason unshot coveys can’t continue to increase until they are knee-deep is, as we mentioned earlier, due to the high annual turnover rate (80%) in quail populations and the fact that birds will not increase beyond the bounds of the existing good habitat.

## soils

Soil quality is a key component of wildlife habitat, and is an especially important consideration in quail management. The best quail lands have soils that are average to highly fertile, well drained, yet retain enough moisture to insure good plant growth. Droughty sand hills or poorly drained flat woods will simply not support high quail populations on a consistent basis.

Soil survey information, available at <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm> can provide clues to drainage, fertility, and the ability of a particular soil to support native and planted quail food plants.

## habitat development

The following quail management recommendations are general in nature but should provide some ideas as to what may be done on land you own, manage or hunt. Specific management recommendations can be made only after an area has been investigated and a management plan prepared.

Management practices geared towards quail will also benefit other wildlife. Rabbits, deer, turkey, doves and many songbirds and

other nongame species will take advantage of the improved habitat conditions.

As has been mentioned many times previously, the only way to permanently increase quail populations on any land is through the maintenance and/or development of quality quail habitat. Quail must be grown as a crop of the land if we are to have better hunting or just more quail. All other theories, tales and methods simply will not work. The procedure involved in producing more quail habitat, however, is relatively simple.

First, if you're a landowner or hunter, think back over the years to places where you consistently observed quail throughout the year. All may be different in appearance but they will contain essentially the same elements: nesting cover, high quality brood habitat, and escape cover. All 3 habitat elements must be in close proximity to one another, and in relative equal proportions. This is commonly referred to as the "Rule of Thirds".

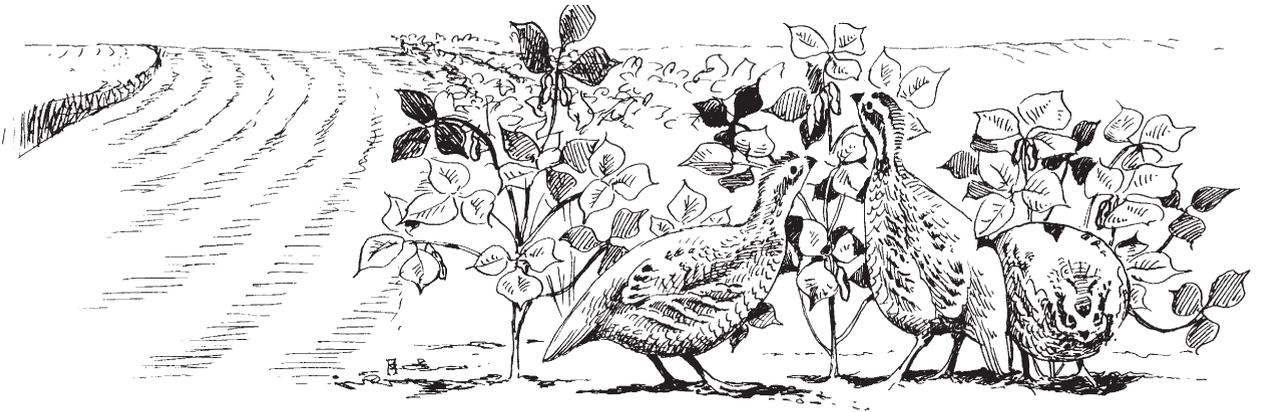
Next look over your land, decide where you can afford to and would like to develop your land for birds, and try to determine just why birds are not using areas where you would like to have them.

## developing cover

Although there is generally an abundance of cover in most of South Carolina, in cases where it is lacking or needs improvement it is necessary to know what constitutes good cover types. In any instance, the amount of cover needed depends on the quality. Preferred cover types are relatively thick above and quite open at ground level. If cover is of high quality, a relatively narrow fence row may be adequate or a covert of 75 to 100 feet square may be sufficient if there is adequate cover close by. Some of the better cover plants include blackberry, wild plum, wild cherry, sumac, greenbriar, palmetto, the viburnums, sassafras, honeysuckle and grapevines. In most areas, adequate cover may be developed simply by protecting areas from such disturbances as fire, disking, mowing

The best quail cover is relatively thick above and open at ground level to allow easy movement.





Soybeans, corn and other cultural crops provide an important supplemental food source for quail. Residue from crop harvest should be allowed to remain in the field as long as compatible with other farming interests.

and over-grazing.

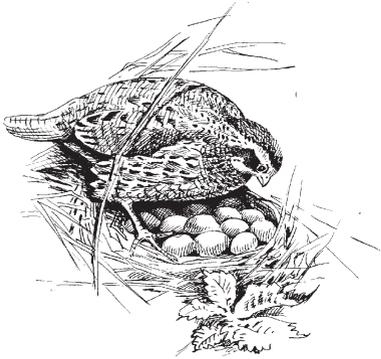
Woodlands, especially pine types, can provide adequate cover if the overstory is managed to allow for the growth of groundcover that quail need. Tall trees provide little security and thick spots of other vegetation are required.

As important as developing cover for quail is the preservation of existing cover. Quail habitat is being destroyed daily to create more cultivatable farmlands and pastures. Much of this land is of marginal value to the farmer, and much land is cleared at a cost which may exceed any possible return. For example, there is barely an acre of land in a half mile of grown up fence row 20 feet wide, but that acre could provide cover and some food for 3 to 4 coveys of quail depending on the quality of habitat in the surrounding area.

So far we have discussed cover used primarily for escape and protection. However, other types of cover are equally important, such as summer nesting and brood cover.

Modern and intensive farming methods, coupled with the rising cost of farm machinery, dictates that landowners get the most return for their investments. This in turn has led to abandonment of tenant-type farming, where the common practice was to leave basically nonproductive field edges in native vegetation. While this could not be considered progressive agriculture, it did provide ideal habitat for quail. The present day practice of plowing and planting fields to the edge has done little to increase total production, since returns are poor on crops planted in the "shaded out" areas, as demonstrated through precision agriculture technology.

In the past, these nonproductive areas also provided proper nesting and brood cover around crop fields and created a suitable environment for a wide variety of insects. Insects provide high protein food important to adults and young birds during the nesting season. In addition, these field borders, or transition zones grow many native quail food plants which provide seed during the winter months.



Quail generally use available dead plant material for nest construction and seem to prefer locations covered with one-two year's growth of herbaceous vegetation. Approximately one-third of the area on scattered, well-drained sites should remain in nesting cover each spring.

Transition zones may be established in the agriculturally unproductive field corners, edges or borders. These zones may be located where woodlands meet crop fields or exposed pastures, and along fence lines and roadways. These transition strips may cover all the unproductive field edge but should never be less than 15-20 feet wide; wider is better. The dry corners of center-pivot irrigation fields also provide an opportunity for bobwhite habitat. The species and composition of the vegetation which invades these areas depends on soil type, fertility, and pH, and especially the time-of year they are disturbed.

The establishment of transition zones is perhaps the easiest and cheapest quail management practice on agricultural land because nature does the work. These zones may be established by simply removing strips of land from its previous use and protecting it from any disturbance such as disking, fire or grazing except for maintenance.

To maintain transition zones in a mixture of legumes, grasses and weeds they must be burned, plowed or disked primarily in the winter months (November 15-February 15 is a good guide) or early spring. It is not always necessary, however, to do this every year and a good rule to thumb is that when more than 50% of the soil is covered in dead vegetation, or unwanted species of plants have invaded, the land needs maintenance. In South Carolina this will occur sometime between 2 and 3 years after establishment. Fields having transition zones around 3 or 4 sides may be maintained on 1 side annually, starting approximately 2 years after the transition zones are established. Winter disking is the preferred maintenance method.

The importance of transition zones in quail management depends largely upon the type of habitat adjoining cultivated areas. Transition zones are of less value in situations where early successional habitat types or ground cover immediately adjoin cultivated areas and are of more value where unusually dense or sparse ground cover exists.

Other types of vegetative cover are also important under certain conditions. Large fields and pastures, for example, contain areas within the center which are not utilized by quail. In fact introduced grass (fescue, bermuda, bahia) pastures and hayfields are almost completely avoided by quail. The turf is too thick at ground level for birds to walk through, especially young quail chicks. A very beneficial practice is to convert at least a portion of these introduced grass fields to native warm season grasses. These native species are bunch grasses in growth form, which provides more open ground and overhead canopy, and also much more plant diversity. They also provide the benefits of being more nutritious for livestock and more drought tolerant than introduced sod forming grasses. Some of the common native warm season grass species are big and little bluestem, indiagrass, and eastern

gamma grass.

Also, quail generally will not venture more than 100 feet into the open from the nearest adequate cover type. To provide access routes into these areas, large fields may be broken into smaller tracts by providing travel lanes across or into these fields. This may be accomplished by leaving undisturbed strips in native vegetation. These strips should be at least 60 feet wide and wider if practical. They may be “set up” by connecting adjacent timbered or cultivated areas or areas providing adequate cover. These strips should be maintained by mowing, disking or burning one side of each strip every 2 or 3 years in the early spring. In order to receive some economic return from crop land removed from production by fallow strips, these areas may be established in pine seedlings on a spacing between 8' x 10' and 12' x 12'. These plantings will provide a permanent cover type for the future as well as some fiscal return.

As quail are basically an annual crop, each year's production of young and the number of quail available in the fall for hunting is dependent on numerous factors, one of the most important of which is the quality and quantity of nesting cover available during the nesting season.

The lack of proper nesting and brood habitat is often a limiting factor in many areas. Quail prefer to construct their nests in areas where the ground is only partially covered with dead vegetation and along openings such as field edges, disked strips, roadways, fence rows, fire breaks, and around cut-over areas and regeneration sites. Areas containing thick ground vegetation are seldom used as it makes movement in the vicinity of the nest difficult for both the adult and young.

Although the prescribed use of fire is often essential in quail management, blocks of unburned habitat should be interspersed with burned areas such that areas of 2-year rough (unburned) are always available.

Because much of the lower part of South Carolina is poorly drained, nesting areas should be developed in locations with minimal risk of flooding.

High quality brood habitat is also critically important. The bobwhite hen (or sometimes the cock) leaves the nest as soon as the chicks are dry, never to return. She leads her brood to an area where the growth at ground level is fairly sparse and devoid of dense vegetation that would impede movement by the chicks. This area must also have good overhead cover as protection from aerial predators, and most importantly an abundance of insects to meet the chicks' high demand for protein.

Open canopy timbered areas that have been burned in the spring will provide some good quality brood habitat that summer, but more intentional and very high quality areas can be established by creating “brood fields”.

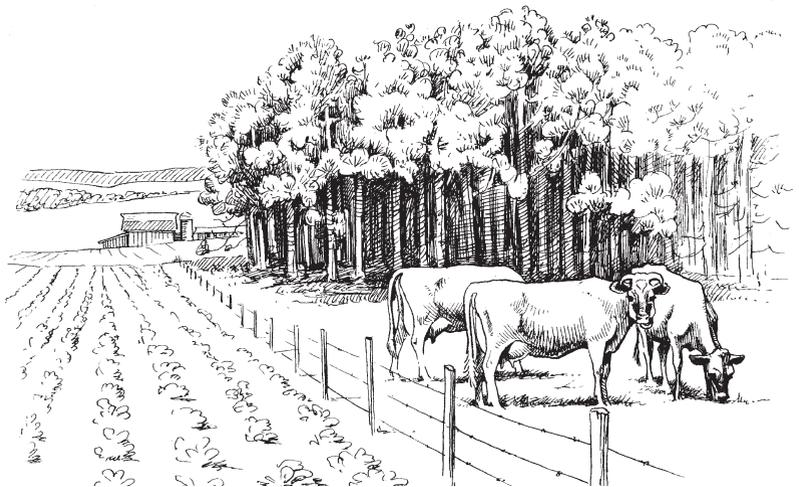
Ideally, a quail property will have 15-30% of the habitat in brood field habitat. Brood fields are preferably 2-5 acres in size, but make them as large as practical. They should be cleared to allow preparation of a good seedbed, and later discing in winter to perpetuate beneficial plants. Maintain soil pH at 6 or above, and fertilize every 2-3 years with a balanced fertilizer to maintain soil fertility. Often, the winter discing will be sufficient to produce the proper plant density and composition. But if good to excellent brood range is desired quicker, a one-time seeding can be employed. Between November and March of the following year, overseed with ragweed at 8 lbs. per acre broadcast, or 5 lbs. per acre drilled. Partridge pea can be added to the mix if desired, but at a rate of no more than 20% partridge pea to 80% ragweed. Partridge pea may volunteer in the field due to the soil disturbance. Once established, brood fields are maintained by light discing between November and March. Utilize any existing small fields to establish brood fields, and when thinning timber, clearcutting some areas to create brood fields where no natural openings exist is a good practice. Try to locate brood fields so they are within about 150-200 yards of each other. Portions of larger brood fields could be planted for deer or turkey plots if desired.

Small, somewhat weedy corn and small grain patches can provide good brood-rearing habitats for quail as well. Larger fallow agricultural fields can produce good brood habitat if a few strips are disked through them in the winter. This provides access for the birds and the lush vegetation volunteering on these strips will attract many insects.

## developing food

Food is naturally an important part of any animal's survival. Habitat that is properly managed for nesting, brood and escape cover will have an abundance of native foods for bobwhites. It is,

Agriculture, timber production and development of improved pastures have greatly reduced modern-day quail habitat.



therefore, beneficial to know the more important quail food plants and become familiar with favored food items in your area.

Managing for quail food plants is done by controlling plant succession through the manipulation of native vegetation by proper burning, and disking. Sometimes other techniques such as limited mowing, mastication or mulching, and herbicides may be necessary.

In these days of rapidly climbing prices, it would probably be better to consider the cheapest and also the easiest method of increasing quail food supplies. Disking, except where it is practical to burn, is probably the cheapest method of manipulating the land to produce desirable quail food plants. Nearly all old fields which contain broomsedge or other vegetation will provide an abundance of native food plants through light disking of strips through these fields. New ground may be used the second year, as an established strip will continue to produce food for several years.

Strips should always be established close to adequate cover. If an increase in seed production is desired, use fertilizer recommended for legumes and at rates dictated by a soil test. Fertilizer may be applied to the strip shortly after disking is completed. The results of fertilization should be closely observed as in some instances undesirable grasses may be encouraged by the increased nutrition. Applications of limestone may also be beneficial, as most legumes grow poorly on acid soils.

Disking in open pine woods is equally beneficial to disking in fallow fields. In addition to providing food, disking also creates an additional edge which may be used for nesting. Disking should be done during winter months, generally mid-November until about mid-February or early March.

Another method of providing food for quail is through the proper manipulation or harvest of the more important row crops planted in South Carolina. Cornfields help to provide year-round quail needs, and soybeans, sorghums and other grains are also good.

Present day methods of planting corn in thick stands, especially for silage, has reduced the overall value of these fields for quail since dense stands and herbicide applications seriously reduce the volunteer growth of annual weeds and other plants preferred by quail. All modern harvest methods, however, waste corn and this will provide food for quail a short time after harvest. If possible, several rows of corn should be left standing around the field edge after harvest is complete. Portions of these will need to be rotary mowed at intervals during the winter months to supply food for coveys during this period.

Likewise, soybeans and the grain sorghums are of more value to birds when a few rows are left standing on field edges. The vegetative part of these plants offer some cover and, in most cases, seeds will scatter out gradually thus providing a source of

food over a period of time. Some modern varieties of soybeans are “shatter-resistant”, and may need to be run over with a tractor or pickup. All of these food supplies should be left close to available escape cover. Late summer or fall plowing of whole fields should be avoided whenever possible. If this practice is necessary, unplowed strips containing crop residue should be left around field edges, preferably adjacent to field borders or transition zones.

In areas where disking, burning, or available row crops will not produce the desired foods, plantings of various high quality quail food plants may be established. However, this is the least important aspect of quail habitat management as properly managed native habitat will provide an abundance of foods for bobwhites.

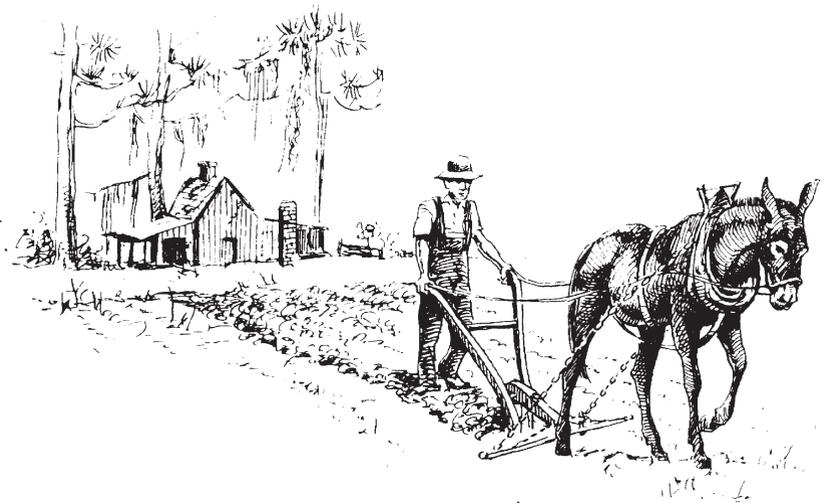
Numerous plantings have been used to provide food for quail. Some of the better ones include the annual lespedezas (common, korean and kobe), browntop millet, and sorghum. A good annual food planting for quail is a mixture of a low growing sorghum and a taller variety such as Egyptian wheat. Low maintenance late winter foods normally planted in this part of the country include the shrub lespedezas (bicolor and thunbergii). Be aware that shrub lespedezas spread and become invasive on some soil types in SC.

Ragweed or a ragweed-partridge pea combination (20% or less partridge pea) provides high quality brood habitat in the summer months. All of these plants require good seedbed preparation, liming and fertilization, and some require cultivation. Specific planting recommendations on these and other quail food plants are given in the appendix section of this booklet.

Size of the plantings should be at least 1/10 acre in size and normally do not need to be larger than 1/4 acre. Plantings should be in long, narrow strips about 15 to 20 feet wide paralleling field borders, forest edges, roadways, grown-up ditches or other areas adjacent to suitable escape cover.

Plantings may also be used to improve suitable woodland types

Early pioneer settlements and the associated patch-farming practices provided ideal quail habitat and resulted in high quail populations during the 1800s and early 1900s.



for quail in order to provide additional food and to concentrate birds for hunting. Woodland plantings should also be in strips

Planted food plots can be an integral part of a quail management plan. However, the quail manager that relies on food plots as the “cure-all” to restoring and maintaining good populations will likely be disappointed. A total habitat management plan that considers the 3 basic needs of nesting, brood and escape cover is the key to a healthy, stable population of bobwhites.

Supplemental feeding- the spreading of grain (sorghum is recommended) to provide food for bobwhites is a proven management technique, but should only be considered after most, if not all steps to improve habitat have been implemented. The basic formula is to establish a narrow tractor trail, not necessarily following woods roads, that snakes back and forth through the uplands at a length of about 1.5-1.7 miles per 100 acres of quail habitat. The goal is to have feedlines spaced approximately 150-200 yards apart. Feed should be broadcast into good cover, and not out in open areas exposing birds to higher risk of predation- this is very important!

Research has shown that an adequate feeding rate is relatively light, and amounts to about 1 bushel per acre per year. This equates to about 2.3 bushels per mile of feed trail, or 0.04 bushels per acre each feeding. Feed trails are typically run every 2-3 weeks as most grain will normally be consumed in that time period.

Benefits of supplemental feeding are that hens go into breeding season in superior physical condition, potentially stimulating earlier nesting attempts, and birds have to spend less time and travel shorter distances foraging for food, and therefore their exposure to predation is reduced. Grain sorghum, also known as milo, is preferred for a feeding program because it contains a high amount of metabolizable energy in a perfect size grain, is fairly rot-resistant, and other than songbirds is less attractive to other wildlife unlike corn or soybeans.

Consult the local DNR Conservation Officer before starting a supplemental feeding program for quail. Depending on the timing of feeding, the size, shape and other attributes of the property, it could be considered baiting during the spring turkey season.

## managing pasture and hay lands

In general it is difficult to maintain good quail populations on land established in temporary or permanent introduced grass pastures. Temporary pastures usually have little value for quail since they are planted in the fall and are usually heavily grazed the following spring and summer. Permanently improved pastures may be of some value to quail if they are properly managed. Moderately grazed permanent pastures may provide some nesting cover around the edges. In some areas, food may be provided by adding

common lespedeza to the pasture mixture. Necessary mowing may be done in early spring provided enough cover is left for nesting. Summer mowing should be avoided if possible as it may destroy nests or cause them to be abandoned. If summer mowing or hay harvest is necessary, a strip approximately 50 feet wide should be left undisturbed on field edges. Normally this practice will greatly reduce the number of quail nests destroyed.

Ideally, pasture fences should be moved in 30-50 feet and the area outside the fence managed for early successional plant communities similar to transition zones around row crop fields. The introduced grasses in these areas will need to be killed in order for this to be successful. Also, consideration should be given to converting a portion of introduced grass pastures to native warm season grass mixtures which will provide much better habitat, and have additional benefits of drought resistance and superior forage quality for livestock.

Large pastures should have areas of existing cover protected, or developed if none exist. Usually these cover spots should be at least 1/4 acre in size and protected from grazing. If possible, encourage cover plants which are seldom grazed and which will offer some protection to existing food plants. A better method of protecting food and cover patches is through fencing, but with this method cost is often prohibitive.

## forest management for quail

High quail populations and good quail hunting are normally associated with cultivated areas and farmlands, but properly managed forest types can also provide quality quail hunting. With so much land in pine tree production in South Carolina, development of timber management practices that provide the needed habitat is essential if quail are to continue to be abundant game birds.

Of all the techniques used in forest management, the proper use of fire is probably the cheapest and most effective method known to improve quail habitat.

During the past several decades, we have gone through a succession of guidelines and advice from both state and federal agencies, encouraging the use of fire in certain types one year, and discouraging its use the next. Today we know, through much research and study, that the proper use of fire in pine stands is beneficial not only in increasing timber production but also in improving these woodlands for quail as well as deer, wild turkey, and many other wildlife species.

Fire can also be used in some hardwood stands to manage oak or oak-pine savannah for bobwhites.

Many quail hunters have been frustrated by birds located in open fields which flew to pine woods containing a dense

The prescribed use of fire in pine forest is one of the most effective and economical ways to improve quail habitat. Since the proper use of fire and smoke management depends on many factors it would be wise to take a Certified Prescribed Fire Manager course.



understory of hardwood sprouts which makes penetration by the hunter difficult and shooting impossible. In these instances, the quail, hunter, and timber could all benefit from the proper use of fire. The quail benefit by the opening of a new preferred habitat, through a reduction of dense understory vegetation, a reduction in rough areas likely to harbor predators, the reduction of ground litter which will make more seeds available, an increased food supply the following fall due to an increase in legume and other quail food plant germination in the spring, additional nesting habitat and probably through a reduction in both internal and external parasites.

The hunter benefits from the opening of a new accessible hunting territory, through better shooting conditions and more enjoyable hunts.

The timber benefits in many ways, including the quick release of needed nutrients into the soil and through reduced competition from the understory hardwoods killed back by the fire.

Fire may be an extremely beneficial tool both in quail and forest management, but it must be remembered that misused fire is dangerous and should be afforded all due respect.

Since the proper use of fire depends on many factors such

This fall covey is huddled in the familiar circular roosting formation. This arrangement aids heat conservation on cold nights.



as topography, amount of fuel, combustibility, relative humidity, temperature, wind direction and velocity, time of day and the composition, age, and condition of the timber to be burned, it is wise to seek the advice of your local S.C. Forestry Commission representative, or someone else experienced in the use of prescribed fire prior to burning.

There are, however, some general guidelines which may be useful in burning for quail. Optimal burning for bobwhites should be conducted on a 2-3 -year rotation between the middle of March and mid-May. Fires used later in the year, called “growing season” burns, are useful under certain conditions but should be used with great caution and only by experienced personnel. Burning earlier in the year, or in the Fall exposes birds to migrating hawks and should be done in small blocks so abundant cover is still present.

Scale of burns is also an important consideration. Woodlands burned for quail management need extra fire lanes established throughout the tract. Smaller burning blocks are preferred, 50 acres or less if possible, but can be larger if the shape of the blocks are long and narrow. Burned and unburned blocks should be adjacent to one another, which juxtaposes nesting habitat (unburned) with brood habitat (burned) in a given year.

There are several different firing techniques that can be used depending on the situation and experience of the burners. Backing fires that burn into the wind are the safest, but also the slowest. Prescribed burning practitioners will often secure a baseline with a backing fire then burn the remainder of the stand with other techniques such as strip head firing or flanking fires. Preferred wind speed is about 6-20 miles per hour from a steady direction.

Relative humidity is important in that it affects the combustibility of the ground litter. As the humidity falls, the fire is likely to become hotter. Preferred relative humidity is 30-55%. Temperature affects fire in that an increase in combustibility and better burning conditions are generally associated with higher temperatures. Preferred temperature is 20-60 degrees Fahrenheit. Fires normally burn faster up-hill than down, but the use of fire on steep slopes may remove ground cover material and speed up soil erosion.

Fire lane plowing equipment should be available should the fire get out of control. State law requires that the S.C. Forestry Commission be notified prior to any burning (toll-free telephone number is 800-777-3473). It is recommended that the Certified Prescribed Fire Manager course, available through the Forestry Commission, be completed. This course details how to avoid adverse impacts from the fire on smoke sensitive areas, and reduces the user’s liability.

The use of fire during February and March on open farmlands provides some of the benefits of disking at a reduced cost. Fire may be used in some locations to reduce dense herbaceous vegetation

and provide for an increase in quail food plants. Fields of broomsedge containing one to several years' growth may come in to various native quail food plants following a winter burn.

In addition to forest characteristics affected by fire, other factors such as density of the timber stand should also be considered in quail management. Very dense timber stands with little sunlight reaching the ground will accrue few benefits for quail from burning. In general, quail prefer moderate to open pine stands, basal area 50 square feet per acre or less, up to 70 square feet per acre. Basal area is a measure of stand density and is dependent on number of trees per acre and the diameter of the trees. A stand with a basal area of 80 square feet per acre would be quite dense with little sunlight reaching the ground. A stand with a basal area of 50 square feet per acre would be more open and park-like, with abundant sunlight reaching the ground.

If quail are to be managed in addition to timber, long rotations (saw timber production) are preferred over short rotations (pulpwood production) as the latter usually result in dense timber stands which provide little quail food or cover after the first 3 or 4 years. Properly managed long rotations in which merchantable trees are removed and natural reproduction periodically thinned can provide good quail habitat. If you are interested in optimum quail habitat, timber harvest and thinning should be extensive enough to reduce the stand density 25 to 30 percent (residual basal area 50 or less) below that recommended for maximum timber production alone.

Where clear-cutting is used as a timber management practice, several small clear-cuts are more desirable than a single large cutover. Leaving scattered clumps of hardwoods within the cut and along branch bottoms will increase "edge" and insure a continuous supply of mast. Generally, clear-cuts should be no more than 40 acres in size and smaller ones are much better.

On adapted sites, longleaf pine should be favored over other southern pine species. Longleaf is more compatible with quail management due to its fire tolerance and larger seed. The crowns of longleaf trees are not as wide as those of other pine species, resulting in less shading of desirable understory plants. Also, longleaf does produce very high quality wood products.

All timber harvest and regeneration activities should follow the guidelines of Best Management Practices (BMP's) available from the S.C. Forestry Commission. BMP's provide for stream-side management zones, proper construction of logging roads, and other precautions to conserve soil and water quality.

If maximum quail management on timbered land is desired, timber harvest and regeneration may be used to develop permanent 1 to 2 acre forest openings which may be planted to a variety of the quail food crops discussed earlier. Permanent openings should average one per 15 to 20 acres, with heavy emphasis on producing high quality brood habitat.

Logging and access roads provide good opportunities for quail management in woodland habitat types. “Daylighting”, which consists of removing trees and other tall vegetation along road edges, will have definite benefits through allowing sunlight to reach the roadbed and shoulders. Wide road shoulders (15-25 feet on each side) will allow growth of native food plants, provide nesting and bugging areas, and could even be used for food plots. Roads do not have to be “daylighted” for their entire length. Mast producing trees left on the road edge add food and cover diversity.

A properly managed forest will provide better than average quail habitat and good timber production, provided the understory is kept open and the timber thinned.

## technical assistance

The South Carolina Department of Natural Resources will provide quail management recommendations for interested landowners. A small game biologist can provide detailed recommendations with consideration for any specific management problem which may not have been covered in this booklet. Contact: SCDNR, Small Game Project, PO Box 167, Columbia, SC 29202; tel: 803-734-3609; e-mail [scbobwhites@dnr.sc.gov](mailto:scbobwhites@dnr.sc.gov).

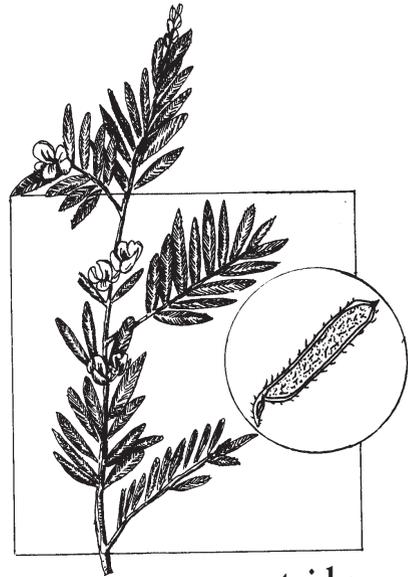
Financial assistance for landowners may be available through one of the many conservation programs administered by the Farm Service Agency (FSA) or the Natural Resources Conservation Service (NRCS). Programs available through these agencies offer cost-share assistance to qualified landowners to address a variety of natural resource concerns, including wildlife habitat improvement. For more information on the availability of USDA cost-share programs and eligible practices, contact your local county Conservation District office, FSA office, NRCS office, or the DNR Small Game Project.

The South Carolina Forestry Commission will provide technical assistance in forest management, including the development of a basic timber management and prescribed burning plan. A multiple-resource management plan is available through the Forest Stewardship Program.

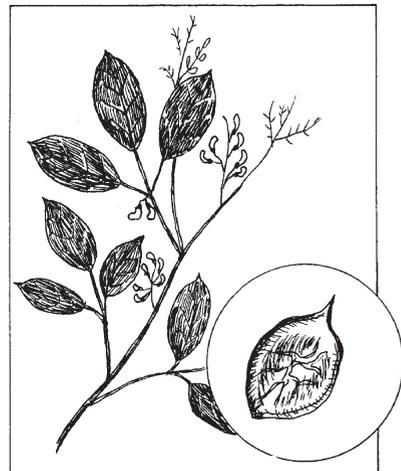
# appendix

Some native plants of value to Bobwhite quail  
(more than 650 species have been documented):

Common Name	Scientific Name
Beggarweed	Desmodium spp.
Ragweed	Ambrosia spp.
Partridge Pea	Cassia spp.
Milk Pea	Galactia spp.
Butterfly Pea	Centrosema spp. Clitoria spp.
Sweet-gum seed	Liquidambar styraciflua
Water Oak	Quercus nigra
Willow Oak	Quercus phellos
Pine seed	Pinus spp.
Dogwood	Cornus florida
Sumacs	Rhus spp.
Wild beans	Strophostyles spp.
Panic grasses	Panicum spp.
Smartweeds	Polygonum spp.
Vetches	Vicia spp.
Crotons	Croton spp.
Blackberries	Rubus spp.
Ground nut	Apios americana
Beggar ticks	Bidens spp.
Chocolate weed	Melochia corchorifolia
Bull grass	Paspalum boscianum
Foxtail grass	Setaria geniculata
Wax myrtle	Myrica cerifera
Running oak	Quercus pumila
Pokeweed	Phytolacca americana
Carpet-weed	Mollugo verticillata
Black cherry	Prunus serotina
Chickasaw plum	Prunus angustifolia
Native lespedezas	Lespedeza spp.
Wild geranium	Geranium carolinianum
Beauty-berry	Callicarpa americana



partridge pea



beggarweed

Note: Insects of many different species are also extremely important food sources for bobwhites, especially young chicks that have a high protein demand for growth.

## Food Plots For Bobwhite Quail

Plant Species	Seedling Rate/Acre	Time To Plant	Planting Depth
Browntop Millet	25 lbs	May 15 - August 1	< 1/2 inch
Kobe Lespedeza*	30 lbs	February - March	< 1/2 inch
Benne (Sesame)	40 lbs	May 1 - July 1	< 1 inch
Sorghum	5-8 lbs (Rows)	May 15 - July 1 30 lbs (Broadcast)	1 inch maximum
Egyptian Wheat	20 lbs	May 15 - July 1	1 1/2 inch maximum
Corn	8 lbs (Rows)	March - April	1 1/2 inch maximum
Soybeans	25 lbs	May 1 - July 15	1 inch maximum
Dove Proso Millet	20 lbs	May 1 - June 15	1 inch maximum
Shrub Lespedeza*	5 lbs (Seed-Drilled)	March - April 24" x 36" Rows (Seedlings)	< 1/2 inch December - March
Partridge Pea	20 lbs	February - March	1 1/2 inch maximum
Wheat	90 lbs	September 15 - November 15	1 1/2 inch maximum
Crimson Clover*	20 lbs	September 15 - November 15	< 1/2 inch
Shrub/Kobe Lespedeza Mix	20 lbs, 20 lbs (Broadcast)	March - April	< 1/2 inch

\*Clover and Lespedeza seed must be inoculated.

Location: in good quail habitat, close to cover, sunlight.

Size: 1/10 acre to 1/4 acre.

Shape: Long and narrow - maximum edge, 20-25 ft x 300-400 ft

Lime & Fertilizer: According to soil tests

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